

# PATENT SPECIFICATION

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## PROVISIONAL SPECIFICATION.

### Improvements in Forced Lubrication Systems for Internal Combustion Engines.

We, ALBION MOTOR CAR COMPANY, LIMITED, a British company, of South Street, Scotstoun, in the County of Renfrew, Scotland, and JOHN DENMAN PARKES, of the same address, of British nationality, do hereby declare the nature of this invention to be as follows:—

This invention relates to forced lubrication systems for internal combustion engines incorporating a centrifugal separator for cleaning the oil in circulation.

It may be explained in the first instance that in connection with such forced lubrication systems it is preferred that only the oil which is to pass to the engine bearings under pressure be admitted to the centrifugal separator, it being understood that the rate of flow of oil to the separator may thus be reduced sufficiently to ensure thorough cleaning in the separator and that engine parts other than such bearings may be arranged to be lubricated by by-passed oil or otherwise.

The invention provides in a forced lubrication system a centrifugal separating apparatus in the nature of an attachment to, as distinguished from a corporate part of, the engine, such apparatus including a rotary separator drum interposed in the oil circuit, said drum having an oil inlet and an oil outlet which may be separated by a skirt or depending partition within the drum, said drum being housed within a casing which may have a double bottom affording a cavity to which is led a connection taken from the pump, the casing having

a detachable cover from which may be led a connection to the bearings. The arrangement is such that on temporary removal of the cover the drum may be readily withdrawn without occasioning a break in the oil circuit; it being understood that after removal of the drum the engine will continue to operate with forced lubrication but without centrifugal cleaning of the oil.

Conveniently, the drum is operatively connected to rotate with a ported tubular spindle having bearings in the bottom of the casing and in the cover, said tubular spindle corresponding in function to the ported tubular spindle of the construction of Specification 251,761.

The centrifugal separator is advantageously so contrived that the rotary drum surrounds but is not surrounded by the oil under treatment; that is to say, separation takes place entirely within the rotary drum which revolves in an air space in the casing, so that in the absence of frictional drag such as is exercised where the drum revolves in a bath of oil the power required to operate the separator is reduced to a minimum.

The drum is preferably underdriven, the ported tubular spindle referred to carrying a pinion driven from the engine timing gear.

Dated this 10th day of September, 1926.

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## COMPLETE SPECIFICATION.

## Improvements in Forced Lubrication Systems for Internal Combustion Engines.

We, ALBION MOTOR CAR COMPANY, LIMITED, a British company, of South Street, Scotstoun, Glasgow, Scotland, and JOHN DENMAN PARKES, of the same address, of British nationality, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to forced lubrication systems for internal combustion engines incorporating a centrifugal separator for cleaning the oil in circulation.

It may be explained in the first instance that in connection with such forced lubrication systems it is preferred that only the oil which is to pass to the engine bearings under pressure be admitted to the centrifugal separator, it being understood that the rate of flow of oil to the separator may thus be reduced sufficiently to ensure thorough cleaning in the separator and that engine parts other than such bearings may be arranged to be lubricated by by-passed oil or otherwise.

The invention provides in a forced lubrication system a centrifugal separating apparatus in the nature of an attachment to, as distinguished from a corporate part of, the engine, such apparatus including a rotary separator drum interposed in the oil circuit, said drum having an oil inlet and an oil outlet, which may be separated by a skirt or depending partition within the drum, said drum being housed within a casing which may comprise upper and lower compartments to the lower end of which is led a connection taken from the pump, the casing having a detachable cover from which may be led a connection to the bearings. The arrangement is such that on temporary removal of the cover the drum may be readily withdrawn without occasioning a break in the oil circuit; it being understood that after removal of the drum and replacement of the cover the engine will continue to operate with forced lubrication but without centrifugal cleaning of the oil.

Conveniently, the drum is operatively connected to rotate with a hollow ported spindle having bearings in the casing and corresponding in function to the hollow

ported spindle of the construction of Specification 251,761.

The centrifugal separator is advantageously so contrived that the rotary drum surrounds but is not surrounded by the oil under treatment; that is to say, separation takes place entirely within the rotary drum which revolves in an air space in the casing, so that in the absence of frictional drag such as is exercised where the drum revolves in a bath of oil the power required to operate the separator is reduced to a minimum.

The drum is preferably underdriven, the ported tubular spindle referred to carrying a pinion driven from the engine.

The figure of the accompanying drawing is a vertical section of a centrifugal separating apparatus to be incorporated in a forced lubrication system in accordance with the invention.

Referring to the drawing, 1 denotes a casing divided into upper and lower compartments 2 and 3 by a transverse partition 4. A hollow spindle 5 mounted to rotate in bearings 6, 6 extends through the compartment 3 into the compartment 2. The wall of the compartment 3 is formed with an inlet port 7 connected to a circulating pump. Oil for lubricating the engine bearings passes from the compartment 3 into the interior of the hollow spindle 5 through ports 8. The wall of the compartment 3 is also formed with a port 9 controlled by an automatically acting relief valve 10, so that oil in excess of that required for the engine bearings may be discharged through the port 9 upon the driving gear 11, thus keeping the gear wheels well lubricated, as is particularly desirable, if, as shown, these are of the spiral type with the axes other than parallel. The upper compartment 2 is provided with a detachable cover 12 having an outlet port 13 connected to the engine bearings. A sleeve member 14 mounted on the upper part of the spindle 5 and comprising upper and lower portions separated by a partition 22 is rotatable in a bush 15 in the cover 12. This sleeve member is fixed to the spindle 5 by means of a key 16 and is unitary with a flange 17 to which are fixed a skirt or depending partition 18 and a drum 19. Ports 20 formed in the wall of the sleeve above the upper end of the spindle 5 open into the annular space enclosed by the

skirt. Ports 21 effect communication between the upper portion of the drum outside the skirt and the upper portion of the sleeve. The upper portion of the sleeve is open to the outlet port 13.

As will be understood, the whole of the oil from the circulation pump enters the lower compartment 3 and of this quantity the proportion demanded by the engine bearings passes up through the spindle 5 and through the centrifuging apparatus and is discharged through the port 13. Oil in excess of that demanded by the engine bearings is discharged through the port 9.

The construction is such that the centrifuging apparatus comprising the drum 19 and the skirt 18 may be easily detached so that if desired the engine may be run with the said apparatus removed without occasioning a break in the oil circuit. When it is desired to remove the centrifuging apparatus, the cover 12 is first removed, and then the sleeve 14, the skirt 18 and the drum 19, which are secured together as one unit, are slipped off the spindle 5. The cover 12 is then replaced, it being understood that the compartment 2 fills up with oil, and thus oil supply for the bearings is delivered through the outlet 13.

Between the compartment 2 and the engine casing indicated at 23 there is a drain hole 24 of comparatively small cross sectional area. An air vent pipe 25 leading from the top of the chamber 2 to the engine casing 23 prevents formation of an air lock. The function of the drain hole 24 is to carry away any leakage to the exterior of the drum when the centrifuge is in action so as to ensure that the drum shall revolve in air. The cross sectional areas of the drain hole 24 and air vent 25 are so small that they have only a negligible effect when the forced lubrication is maintained with the centrifuge removed.

It may be observed that when the centrifuge is in operation the drum 19 cannot come adrift as the flange 17 is restrained by the bush 15.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. In a forced lubrication system for internal combustion engines incorporating a centrifugal separator, in combination, a casing attachable to the engine, the casing having an inlet, a removable cover for the casing provided with an outlet, and a rotary separator drum removably fitted within the casing, the interior of the drum being in communication with the inlet and the outlet, the arrangement being such that when the drum is removed the casing fills up with oil whereupon with admission of further oil through the inlet delivery of oil is effected through the outlet in the cover.

2. As a component of a forced lubrication system, a centrifugal separator apparatus which comprises a casing divided into an upper and a lower compartment, the lower compartment having an inlet port and also having a valve-controlled relief port, a hollow ported spindle extending through said lower compartment into said upper compartment, a ported sleeve member on said spindle, located in said upper compartment, a drum secured to said sleeve member to rotate therewith within said upper compartment, and a cover for the upper compartment having an outlet port, the arrangement being such that oil admitted to the lower compartment flows by way of the spindle, sleeve and drum to the outlet.

3. A forced lubrication system incorporating a centrifugal separator constructed and arranged to operate substantially as described with reference to the accompanying drawing.

Dated this 9th day of June, 1927.

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[This Drawing is a reproduction of the Original on a reduced scale.]

